

WHAT IS CLAIMED IS

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1. An image reading device comprising:

a photoelectric device provided with an empty
transfer part;

an A-D converter performing A-D conversion on
10 an output signal for each pixel of said photoelectric
device;

a reference voltage varying part varying a
reference voltage of said A-D converter;

a detecting part detecting a black correction
15 reference data from output for each pixel of said
photoelectric device;

a black shading correcting part subtracting
the black correction reference data from digital image
data obtained from the output signal for each pixel of
20 said photoelectric device when an image is read, through
said A-D converter having the reference voltage set
therein; and

a correcting part correcting the black
correction reference data by a ratio between an output
25 level of said empty transfer part obtained through said

A-D converter when the black correction reference data is detected and an output level of said empty transfer part obtained through said A-D converter when the image is read.

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2. An image reading device comprising:

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a photoelectric device;

an empty transfer part output generating part falsely generating an output of empty transfer part of said photoelectric device by outputting a predetermined voltage in predetermined timing;

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an A-D converter performing A-D conversion on an output signal for each pixel of said photoelectric device;

a reference voltage varying part varying a reference voltage of said A-D converter;

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a detecting part detecting a black correction reference data from output for each pixel of said photoelectric device;

a black shading correcting part subtracting the black correction reference data from digital image data obtained from the output signal for each pixel of

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said photoelectric device when an image is read, through
said A-D converter having the reference voltage set
therein; and

a correcting part correcting the black
5 correction reference data by a ratio of an output level
of said empty transfer part output generating part
obtained through said A-D converter when the black
correction reference data is detected and an output
level of said empty transfer part output generating part
10 obtained through said A-D converter when the image is
read.

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3. The image reading device as claimed in
claim 1, wherein said photoelectric device comprises a
unity magnification contact-type sensor which receives
reflected light from an original through a unity
20 magnification optical system.

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4. The image reading device as claimed in

claim 2, wherein said photoelectric device comprises a unity magnification contact-type sensor which receives reflected light from an original through a unity magnification optical system.

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5. The image reading device as claimed in
10 claim 1, wherein said correcting part comprises:
a first adding circuit calculating a sum of
output levels of said empty transfer part for
predetermined pixels obtained when the black correction
reference data is detected;
15 a second adding circuit calculating a sum of
output levels of said empty transfer part for the
predetermined pixels obtained when the image is read;
a multiplying circuit multiplying the sum
output from said second adding circuit with the black
20 correction reference data;
a dividing circuit dividing the result of
multiplication output from said multiplying circuit by
the sum output from said first adding circuit, and
outputting the result of the division as the black
25 correction reference data after the correction.

6. The image reading device as claimed in claim 2, wherein said correcting part comprises:

5 a first adding circuit calculating a sum of false output levels of empty transfer part from said empty transfer part output generating part for predetermined pixels obtained when the black correction reference data is detected;

10 a second adding circuit calculating a sum of false output levels of empty transfer part from said empty transfer part output generating part for the predetermined pixels obtained when the image is read;

a multiplying circuit multiplying the sum output from said second adding circuit with the black correction reference data;

15 a dividing circuit dividing the result of multiplication output from said multiplying circuit by the sum output from said first adding circuit, and outputting the result of the division as the black correction reference data after the correction.

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7. The image reading device as claimed in claim 1, wherein said correcting part comprises:

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a first adding circuit calculating a sum of output levels of said empty transfer part for predetermined pixels obtained when the black correction reference data is detected;

5 a second adding circuit calculating a sum of output levels of said empty transfer part for the predetermined pixels obtained when the image is read;

 a microcomputer multiplying the sum output from said second adding circuit with the black
10 correction reference data; and

 dividing the result of the multiplication by the sum output from said first adding circuit, and outputting the result of the division as the black correction reference data after the correction.

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8. The image reading device as claimed in
20 claim 2, wherein said correcting part comprises:

 a first adding circuit calculating a sum of false output levels of empty transfer part from said empty transfer part output generating part for predetermined pixels obtained when the black correction
25 reference data is detected;

a second adding circuit calculating a sum of false output levels of empty transfer part from said empty transfer part output generating part for the predetermined pixels obtained when the image is read;

5 a microcomputer multiplying the sum output from said second adding circuit with the black correction reference data; and

dividing the result of the multiplication by the sum output from said first adding circuit, and
10 outputting the result of the division as the black correction reference data after the correction.

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9. An image forming apparatus comprising:
the image reading device claimed in claim 1;

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an image forming device forming an image on a
20 sheet based on the image data read by said image reading device.

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10. An image forming apparatus comprising:
the image reading device claimed in claim 2;

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an image forming device forming an image on a
5 sheet based on the image data read by said image reading
device.

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11. An image reading device comprising:
photoelectric means provided with empty
transfer part;

A-D converting means for performing A-D
15 conversion on an output signal for each pixel of said
photoelectric means;

reference voltage varying means for varying a
reference voltage of said A-D converting means;

detecting means for detecting a black
20 correction reference data from output for each pixel of
said photoelectric means;

black shading correcting means for subtracting
the black correction reference data from digital image
data obtained from the output signal for each pixel of
25 said photoelectric means when an image is read, through

said A-D converting means having the reference voltage set therein; and

correcting means for correcting the black correction reference data by a ratio of an output level of said empty transfer part obtained through said A-D converting means when the black correction reference data is detected and an output level of said empty transfer part obtained through said A-D converting means when the image is read.

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12. An image reading device comprising:

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photoelectric means;

empty transfer part output generating mean for falsely generating an output of empty transfer part of said photoelectric means by outputting a predetermined voltage in predetermined timing;

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A-D converting means for performing A-D conversion on an output signal for each pixel of said photoelectric means;

reference voltage varying means for varying a reference voltage of said A-D converting means;

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detecting means for detecting a black

correction reference data from output for each pixel of
said photoelectric means;

black shading correcting means for subtracting
the black correction reference data from digital image
5 data obtained from the output signal for each pixel of
said photoelectric means when an image is read, through
said A-D converting means having the reference voltage
set therein; and

correcting means correcting the black
10 correction reference data by a ratio of an output level
of said empty transfer part output generating means
obtained through said A-D converting means when the
black correction reference data is detected and an
output level of said empty transfer part output
15 generating means obtained through said A-D converting
means when the image is read.

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13. The image reading device as claimed in
claim 11, wherein said photoelectric means comprises a
unity magnification contact-type sensor which receives
reflected light from an original through a unity
25 magnification optical system.

14. The image reading device as claimed in claim 12, wherein said photoelectric means comprises a unity magnification contact-type sensor which receives reflected light from an original through a unity magnification optical system.

10 15. The image reading device as claimed in claim 11, wherein said correcting means comprises:

first adding means for calculating a sum of output levels of said empty transfer part for predetermined pixels obtained when the black correction

15 reference data is detected;

second adding means for calculating a sum of output levels of said empty transfer part for the predetermined pixels obtained when the image is read;

20 multiplying means for multiplying the sum output from said second adding means with the black correction reference data;

dividing means for dividing the result of multiplication output from said multiplying means by the sum output from said first adding means, and outputting

25 the result of the division as the black correction

reference data after the correction.

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16. The image reading device as claimed in claim 12, wherein said correcting means comprises:

first adding means for calculating a sum of false output levels of empty transfer part from said empty transfer part output generating means for predetermined pixels obtained when the black correction reference data is detected;

second adding means for calculating a sum of false output levels of empty transfer part from said empty transfer part output generating means for the predetermined pixels obtained when the image is read;

multiplying means for multiplying the sum output from said second adding means with the black correction reference data;

dividing means for dividing the result of multiplication output from said multiplying means by the sum output from said first adding means, and outputting the result of the division as the black correction reference data after the correction.

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17. The image reading device as claimed in claim 11, wherein said correcting means comprises:

first adding means for calculating a sum of output levels of said empty transfer part for
5 predetermined pixels obtained when the black correction reference data is detected;

second adding means for calculating a sum of output levels of said empty transfer part for the predetermined pixels obtained when the image is read;

10 a microcomputer multiplying the sum output from said second adding means with the black correction reference data; and

dividing the result of the multiplication by the sum output from said first adding means, and
15 outputting the result of the division as the black correction reference data after the correction.

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18. The image reading device as claimed in claim 12, wherein said correcting means comprises:

first adding means for calculating a sum of false output levels of empty transfer part from said
25 empty transfer part output generating means for

predetermined pixels obtained when the black correction reference data is detected;

second adding means for calculating a sum of false output levels of empty transfer part from said empty transfer part output generating means for the predetermined pixels obtained when the image is read;

a microcomputer multiplying the sum output from said second adding means with the black correction reference data; and

dividing the result of the multiplication by the sum output from said first adding means, and outputting the result of the division as the black correction reference data after the correction.

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19. An image forming apparatus comprising:
the image reading device claimed in claim 11;

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image forming means for forming an image on a sheet based on the image data read by said image reading device.

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20. An image forming apparatus comprising:
the image reading device claimed in claim 12;

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image forming means for forming an image on a
5 sheet based on the image data read by said image reading
device.